

**Amendments to the Claims:**

This listing of the claims will replace all prior versions, and listings, of the claims in the application:

**Listing of Claims:**

Claim 1 (original): A process for treating a halogen-containing gas, comprising:  
providing a treatment gas that includes at least one halogen-containing gas;  
mixing at least one gaseous reducing agent with the treatment gas resulting in a feed gas mixture; and  
generating a non-thermal plasma in the feed gas mixture in the presence of a liquid to reduce the halogen-containing gas.

Claim 2 (original): A process according to claim 1, wherein the treatment gas comprises a mixture of about 0.000001 to about 25 volume % halogen-containing gas and at least one non-halogenated gas diluent.

Claim 3 (original): A process according to claim 1, wherein the temperature of the feed gas mixture does not exceed about 100°C during generation of the non-thermal plasma.

Claim 4 (original): A process according to claim 1, wherein the liquid comprises water.

Claim 5 (previously presented): A process according to claim 1, wherein the reducing agent is selected from hydrogen, hydrocarbon, ammonia, hydrazine, hydride, amine, water, and amide.

Claim 6 (original): A process according to claim 1, wherein the liquid absorbs the heat produced from the reduction of the halogen-containing gas.

Claim 7 (original): A process according to claim 1, wherein the non-thermal plasma comprises a silent discharge plasma.

Claim 8 (original): A process according to claim 1, wherein the liquid has a boiling point of less than about 150°C and a heat of vaporization of at least about 35 kJ/mole.

Claim 9 (original): A process for treating a halogen-containing gas, comprising:  
introducing a halogen-containing gas and a reducing agent into a chamber;  
introducing a liquid into the chamber;  
generating a non-thermal plasma in the chamber to reduce the halogen-containing gas;  
and  
exhausting the resulting reduction product from the chamber.

Claim 10 (original): A process according to claim 9, wherein the liquid flows through the chamber during generation of the non-thermal plasma.

Claim 11 (original): A process according to claim 10, wherein the halogen-containing gas and the reducing agent flow through the chamber in a first current direction and the liquid flows through the chamber in a second current direction that is substantially co-current with the first current direction.

Claim 12 (original): A process according to claim 10, wherein the halogen-containing gas and the reducing agent flow through the chamber in a first current direction and the liquid flows through the chamber in a second current direction that is substantially counter-current with the first current direction.

Claim 13 (original): A process according to claim 9, wherein the chamber contains at least one electrode and the liquid flows as a film over at least a portion of the electrode.

Claim 14 (original): A process according to claim 13, wherein the reducing agent is a gas that is introduced into the chamber by bubbling the gaseous reducing agent through the liquid film.

Claim 15 (original): A process according to claim 9, wherein the liquid comprises water.

Claim 16 (original): A process according to claim 13, wherein the non-thermal plasma is generated at or near a surface of the liquid film.

Claim 17 (original): A process according to claim 9, wherein the reducing agent is selected from hydrogen, hydrocarbon, ammonia, hydrazine, hydride, amine, and amide.

Claim 18 (original): A process according to claim 9, wherein the liquid absorbs the heat produced from the reduction of the halogen-containing gas.

Claim 19 (original): A process according to claim 9, wherein the non-thermal plasma comprises a silent discharge plasma.

Claim 20 (original): A process according to claim 9, wherein the temperature of the halogen-containing gas, the reducing agent, and the resulting reaction product do not exceed about 100°C during generation of the non-thermal plasma.

Claim 21 (original): A process according to claim 9, wherein the liquid has a boiling point of less than about 150°C and a heat of vaporization of at least about 35 kJ/mole.

Claim 22 (original): A process for treating a halogen-containing gas, comprising:  
providing a treatment gas that includes at least one halogen-containing gas;  
mixing at least one gaseous reducing agent with the treatment gas resulting in a feed gas mixture;

generating a non-thermal plasma in the feed gas mixture in the presence of liquid water to produce a reaction product mixture that includes a water-soluble halogen-containing reduction product; and

separating the water-soluble halogen-containing reduction product from the reaction product mixture.

Claim 23 (original): A process according to claim 22, wherein the separating step comprises aqueous scrubbing.

Claim 24 (original): A process for treating a halogen-containing gas, comprising:  
providing a treatment gas that includes at least one halogen-containing gas;  
mixing at least one gaseous reducing agent with the treatment gas resulting in a feed gas mixture;

generating a non-thermal plasma in the feed gas mixture in the presence of liquid water to reduce the halogen-containing gas and produce a water-soluble halogen-containing reduction product; and

dissolving at least a portion of the amount of the water-soluble halogen-containing reduction product into the liquid water.

Claim 25 (original): A process for treating a halogen-containing gas, comprising:  
providing a treatment gas that includes at least one halogen-containing gas;  
mixing at least one gaseous reducing agent with the treatment gas resulting in a feed gas mixture; and

generating a plasma in the feed gas mixture in the presence of liquid water to reduce the halogen-containing gas.

Claim 26 (original): A process according to claim 25, wherein the treatment gas comprises a mixture of about 0.000001 to about 25 volume % halogen-containing gas and at least one non-halogenated gas diluent.

Claim 27 (original): A process according to claim 25, wherein the temperature of the feed gas mixture does not exceed about 100°C during generation of the plasma.

Claim 28 (previously presented): A process according to claim 25, wherein the reducing agent is selected from hydrogen, hydrocarbon, ammonia, hydrazine, hydride, amine, water, and amide.

Claim 29 (original): A process according to claim 25, wherein the liquid water absorbs the heat produced from the reduction of the halogen-containing gas.

Claim 30 (original): A process for treating fluorine gas, comprising:  
providing a treatment gas that includes fluorine gas;  
mixing at least one reducing agent with the treatment gas resulting in a feed gas mixture;  
and  
generating a non-thermal plasma in the feed gas mixture to convert the fluorine gas to hydrogen fluoride gas.

Claim 31 (original): A process according to claim 30, wherein the treatment gas further comprises at least one non-halogenated gas.

Claim 32 (original): A process according to claim 31, wherein the non-halogenated gas comprises nitrogen.

Claim 33 (original): A process according to claim 30, wherein the treatment gas comprises about 0.000001 to about 25 volume % fluorine gas.

Claim 34 (previously presented): A process according to claim 30, wherein the reducing agent is selected from hydrogen, hydrocarbon, ammonia, hydrazine, hydride, amine, water, and amide.

Claim 35 (original): A process according to claim 30, wherein the reducing agent comprises hydrogen.

Claim 36 (original): A process according to claim 35, wherein the amount of hydrogen mixed with the fluorine gas is about 0.5:1 to about 4:1 H<sub>2</sub>:F<sub>2</sub> atom molar ratio.

Claim 37 (original): A process according to claim 30, further comprising dissolving the hydrogen fluoride in water.

Claim 38 (original): A process for treating fluorine gas, comprising:  
providing a treatment gas that includes fluorine gas;  
mixing at least one gaseous reducing agent with the treatment gas resulting in a feed gas mixture; and  
generating a non-thermal plasma in the feed gas mixture in the presence of a liquid to convert the fluorine gas to hydrogen fluoride gas.

Claim 39 (original): A process according to claim 38, wherein the treatment gas further comprises at least one non-halogenated gas.

Claim 40 (original): A process according to claim 39, wherein the non-halogenated gas comprises nitrogen.

Claim 41 (original): A process according to claim 38, wherein the treatment gas comprises about 0.000001 to about 25 volume % fluorine gas.

Claim 42 (previously presented): A process according to claim 38, wherein the reducing agent is selected from hydrogen, hydrocarbon, ammonia, hydrazine, hydride, amine, water, and amide.

Claim 43 (original): A process according to claim 38, wherein the reducing agent comprises hydrogen.

Claim 44 (original): A process according to claim 43, wherein the amount of hydrogen mixed with the fluorine gas is about 0.5:1 to about 4:1 H<sub>2</sub>:F<sub>2</sub> atom molar ratio.

Claim 45 (original): A process according to claim 38, further comprising dissolving the hydrogen fluoride in water.

Claim 46 (original): A process according to claim 38, wherein the liquid comprises water.

Claim 47 (original): A process according to claim 44, wherein the liquid comprises water.

Claim 48 (original): A process according to claim 38, wherein the liquid has a boiling point of less than about 150°C and a heat of vaporization of at least about 35 kJ/mole.

Claim 49 (original): A process for treating fluorine gas, comprising:  
providing a treatment gas that includes fluorine gas;  
mixing at least one hydrogen-donating gas with the treatment gas resulting in a feed gas mixture; and  
generating a non-thermal plasma in the feed gas mixture in the presence of water to convert the fluorine gas to hydrogen fluoride gas.

Claim 50 (original): A process for treating fluorine gas, comprising:  
introducing fluorine gas into a chamber;  
introducing a reducing agent into the chamber;  
generating a non-thermal plasma in a mixture that includes the fluorine gas and the reducing agent contained in the chamber to reduce the fluorine gas to hydrogen fluoride; and  
exhausting the hydrogen fluoride from the chamber.

Claim 51 (original): A process according to claim 50, further comprising introducing a liquid into the chamber.

Claim 52 (original): A process according to claim 51, wherein the chamber contains at least one electrode and the liquid flows as a film over at least a portion of the electrode.

Claim 53 (original): A process according to claim 52, wherein the reducing agent is a gas that is introduced into the chamber by bubbling the gaseous reducing agent through the liquid film.

Claim 54 (original): A process according to claim 51, wherein the liquid comprises water.

Claim 55 (original): A process according to claim 50, wherein the fluorine gas is included in a mixture with nitrogen.

Claim 56 (previously presented): A process according to claim 50, wherein the reducing agent is selected from hydrogen, hydrocarbon, ammonia, hydrazine, hydride, amine, water, and amide.

Claim 57 (previously presented): A process for treating a halogen-containing gas, comprising:

- providing a chamber defining at least one gas inlet for receiving a feed gas mixture that includes a halogen-containing gas and a gaseous reducing agent, and at least one water inlet for receiving liquid water;

- providing at least one first electrode disposed within the chamber;

- providing at least one second electrode disposed within the chamber;

- flowing the liquid water over at least a portion of the first electrode; and

- applying electric potential to at least one of the first or second electrodes so as to generate a plasma in the feed gas mixture and reduce the halogen-containing gas.



Claim 58 (original): A process according to claim 57, wherein a dielectric barrier is disposed on a surface of at least one of the first or second electrodes and the generated plasma comprises a non-thermal plasma.

Claim 59 (original): A process according to claim 57, further comprising providing gas/liquid scrubbing packing material within the chamber.

Claim 60 (original): A process for treating a halogen-containing gas, comprising:  
providing a chamber defining at least one first gas inlet for receiving a halogen-containing gas, and at least one water inlet for receiving liquid water;  
providing at least one first electrode disposed within the chamber and defining at least one second gas inlet for receiving a gaseous reducing agent;  
providing at least one second electrode disposed within the chamber;  
flowing the liquid water over at least a portion of the first electrode;  
introducing the gaseous reducing agent through the liquid water and into the chamber so as to mix with the halogen-containing gas and form a feed gas mixture; and  
applying electric potential to the first and second electrodes so as to generate a plasma in the feed gas mixture and reduce the halogen-containing gas.

Claim 61 (original): A process according to claim 60, wherein a dielectric barrier is disposed on a surface of at least one of the first or second electrodes and the generated plasma comprises a non-thermal plasma.

Claim 62 (original): A process according to claim 60, further comprising providing gas/liquid scrubbing packing material within the chamber.

Claims 63-79 (canceled).

Claim 80 (previously presented): A process according to claim 4, further comprising adding at least calcium hydroxide or sodium hydroxide to the water.

Claim 81 (previously presented): A process according to claim 37, further comprising adding at least calcium hydroxide or sodium hydroxide to the water prior to dissolving the hydrogen fluoride in the water.

Claim 82 (previously presented): A process according to claim 45, further comprising adding at least calcium hydroxide or sodium hydroxide to the water prior to dissolving the hydrogen fluoride in the water.

Claim 83 (previously presented): A process according to claim 56, further comprising adding at least calcium hydroxide or sodium hydroxide to the water.

Claim 84 (previously presented): A process according to claim 1, further comprising vaporizing a liquid reducing agent to produce the gaseous reducing agent for mixing with the treatment gas.

Claim 85 (previously presented): A process according to claim 22, further comprising vaporizing a liquid reducing agent to produce the gaseous reducing agent for mixing with the treatment gas.

Claim 86 (previously presented): A process according to claim 30, further comprising vaporizing a liquid reducing agent to produce the gaseous reducing agent for mixing with the treatment gas.

Claim 87 (previously presented): A process according to claim 50, wherein the reducing agent is introduced into the chamber as a liquid that is subsequently vaporized within the chamber.

Claim 88 (previously presented): A process for treating a halogen-containing gas, comprising:  
providing a treatment gas that includes at least one halogen-containing gas;

providing a liquid;  
vaporizing a portion of the liquid;  
mixing the vaporized liquid portion with the treatment gas resulting in a reaction mixture;  
and  
generating a non-thermal plasma in the reaction mixture in the presence of the non-vaporized portion of the liquid to reduce the halogen-containing gas.

Claim 89 (previously presented): The process according to claim 88, wherein the liquid comprises water.

Claim 90 (previously presented):. The process according to claim 88, wherein the vaporizing of a portion of the liquid is effected by the liquid absorbing heat produced by the reduction of the halogen-containing gas.

Claim 91 (previously presented): A process for treating fluorine gas, comprising:  
introducing fluorine gas into a chamber;  
introducing liquid water into the chamber;  
vaporizing a portion of the liquid water in the chamber; and  
generating a plasma in the chamber in the presence of the non-vaporized portion of the liquid water to convert the fluorine gas to hydrogen fluoride gas.

Claim 92 (previously presented): The process according to claim 91, wherein the plasma comprises a non-thermal plasma.

Claims 93-95 (canceled).

Claim 96 (new): A process according to claim 30, wherein the reducing agent comprises water vapor.

Claim 97 (new): A process according to claim 30, wherein the non-thermal plasma is generated in a silent discharge reactor or a pulsed-DC reactor, the method comprising mixing the

treatment gas and the reducing agent to form the feed gas mixture and then introducing the feed gas mixture into the silent discharge reactor or pulsed-DC reactor.

Claim 98 (new): A process according to claim 97, wherein the reducing agent comprises water vapor.

Claim 99 (new): A process according to claim 30, wherein the non-thermal plasma comprises a silent discharge plasma.

Claim 100 (new): A process for treating fluorine gas, comprising:  
introducing a mixture of fluorine gas and water vapor into a chamber;  
generating a non-thermal plasma in the mixture contained in the chamber to convert the fluorine gas to hydrogen fluoride; and  
exhausting the hydrogen fluoride from the chamber.

Claim 101 (new): A process according to claim 100, wherein the non-thermal plasma comprises a silent discharge plasma.